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**Program Cost Element Definitions**  
**Discovery Program**  
**February 2004**

**Introduction**

This is a short dictionary of definitions for the cost elements shown in the figures and tables and discussed in the Discovery Announcement of Opportunity.

**Project Management/Mission Analysis/Systems Engineering**

Project management costs include all efforts associated with project level planning and directing of prime and subcontractor efforts and interactions, as well as project-level functions such as quality control and product assurance. Mission Analysis includes preflight trajectory analysis and ephemeris development. Systems engineering is the project-level engineering required to ensure that all satellite subsystems and payloads function properly to achieve system goals and requirements. This cost element also includes the data/report generation activities required to produce internal and deliverable documentation. Project management for phase E is to be shown as a separate line item under Phase E (Operations).

**Instruments**

Instrument costs include costs incurred to design, develop and fabricate the individual scientific instruments or instrument systems through delivery of the instruments to the spacecraft for integration. Costs for instrument integration, assembly, and test are to be shown separately from instrument development. Costs incurred for integration of the instruments to the spacecraft are included in the spacecraft Integration, Assembly & Test (IA&T) cost element (see below).

**Spacecraft Bus**

Spacecraft bus costs include costs incurred to design, develop, and fabricate (or procure) the spacecraft subsystems. Costs for integration and assembly are not included in this element. Component level test and burn-in is included in this cost element. System tests are included in Spacecraft IA&T (see below).

**Spacecraft Integration, Assembly and Test**

Spacecraft IA&T is the process of integrating all spacecraft subsystems and payloads into a fully tested, operational satellite system. The total cost of IA&T for a satellite includes research/requirements specification, design and scheduling analysis of IA&T procedures, ground support equipment, systems test and evaluation, and test data analyses. Typical satellite system tests include thermal vacuum, thermal cycle, electrical and mechanical functional, acoustic, vibration, electromagnetic compatibility/interference, and pyroshock.

**Launch Checkout and Orbital Operations**

Launch checkout and orbital operations support costs are those involving pre-launch planning, launch site support, launch-vehicle integration (spacecraft portion), and the first 30 days of flight operations.

**Pre-Launch Science Team Support**

Includes all Phase C/D (pre-launch) support costs for the science team. (See below for post-launch component.)

**Pre-Launch Ground Data System/Mission Operations System Development**

Includes costs associated with development and acquisition of the ground infrastructure used to transport and deliver the telemetry and other data to/from the Mission Operations Center and the Payload Operations Center. (For more information, refer to NASA's *Mission Operations and Communications Services* document in the Discovery Program Library.) Includes development of science data processing and analysis capability. Also includes pre-launch training of the command team, development and execution of operations simulations, sequence development, and flight control software. This element includes any mission-unique tracking network development costs.

**Mission Operations (MO)**

This cost element refers only to Phase E (post-launch). Mission operations comprises all activities required to plan and execute the science objectives, including spacecraft and instrument navigation, control, pointing, health monitoring, and calibration. Costs include all post-launch costs for people, procedures, services, hardware and software to carry out these activities.

**Data Analysis (DA)**

This cost element refers only to Phase E (post-launch). Data analysis activities include collecting, processing, distributing and archiving the scientific data in the appropriate data archive. Costs include all post-launch costs for people, procedures, services, hardware and software to carry out these activities. Includes science team support costs post-launch.

**Deep Space Network (DSN) or Other Tracking Services**

DSN/tracking services for communications between the spacecraft and Earth control center and station complexes are acquired through JPL. This line item includes all costs associated with this service for the specific proposed mission profile. (Refer to NASA's *Mission Operations and Communications Services* document in the Discovery Program Library.)

**Education and Public Outreach**

Includes all costs associated with developing and implementing the proposed project's programs for education and public outreach.

**Project-Unique Facilities**

If the proposed project requires construction or lease of any ground facilities, include here only the portion of costs to be borne by the proposed project, with description of the nature and extent of any cost-sharing arrangements assumed.

**Launch Services**

Launch vehicles and services are either procured and provided by NASA to launch spacecraft under fixed price contracts, or provided by the proposer as a contribution. Launch service price includes procurement of the ELV, spacecraft-to-launch vehicle integration, placement of spacecraft into designated orbit, analysis, post-flight mission data evaluation, oversight of the launch service and coordination of mission-specific integration activities. (For more information, refer to the *Discovery Launch Services Information Summary* in the Discovery Program Library.)

**Reserves**

Reserves should include those project funds that are not allocated specifically to estimated resources, but are held against contingencies or underestimation of resources to mitigate the investigation risk. Reserves should be reported according to the proposed reserve management strategy. For example, if the reserve is divided into funds to be pre-allocated to the flight system and instrument payload, with another portion held at the project level, specific dollar amounts to fund each must be identified.

**NASA Center Costs (all categories)**

Additional costs borne by the program for NASA Center participation. For example, there may be additional program management/systems engineering costs, above those incurred by the spacecraft prime contractor, which are due to NASA employee participation. These costs must be reported on a full-cost accounting basis.